Setting and Changing Aircraft Parameters

Software Developer Kit #1

[11.29.00]

In Combat Flight Simulator 2, as in Microsoft Flight Simulator 98 and 2000, you can import new aircraft and add or change values in the associated aircraft.cfg file to modify aircraft behavior, performance, and damage.

IMPORTANT: The information included in the SDK is intended as a reference for programmers. It assumes familiarity with C programming language, Macro Assembler (MASM), and game development. The information is not supported by Microsoft Product Support.

This document shows how to set several aircraft parameters that have been added since the introduction of Flight Simulator 2000.

ABOU

This is the first in a ser articles for Microsoft® Simulator 2.

In this article we explo mechanical aspects of changing aircraft perfo

In future articles we will disc

- **Converting CFS1 aircraft fo**
- **Importing additional aircra**
- **Adding or changing terrain**
- **Building missions and camp**

Specifically, it shows:

- How the aircraft responds to contact with the ground or ground ob
- How to simulate flap articulation
- How the door or cockpit egress works
- How the wings fold (on carrier-based aircraft)
- How the arresting gear affects the aircraft (on carrier-based aircra
- How to modify the pilot's view or eyepoint
- How to alter the speed at which the Landing Signals Officer (LSO) t in to land

For a general discussion of the aircraft.cfg and all its uses, go to the Fligh SDK, scroll down and then download the Aircraft Container section.

Reaction to Contact

In Microsoft Combat Flight Simulator 2 you can configure and adjust the v to different kinds of contact, including landing gear contact and articulat

steering, and damage accrued through excessive speed or in battle.

You can also configure each contact point independently for each aircraft limit to the number of points you can add. The data for configuring the p in the `[contact_points]` section of the *aircraft.cfg*. When importi that does not contain this set of data, the program will generate the data the first time the aircraft is loaded, and then write it to the *aircraft.cfg*.

It may be useful to first look at the *.cfg* file of an existing CFS2 aircraft; y lot from the many developer comments, which are followed by two slash right side of the page.

Each contact point contains a series of values that define the characteris separated by commas. Each point's data set takes the form point.n= wher to the particular point, followed by the data.

Example:

```
[contact_points]
point.0= 1, -18.00, 0.00, -3.35, 3200.0, 0, 0.
0.25, 2.5, 0.90, 1.0, 4.00, 0, 0, 200
```

Below is a description of each element of the contact points data set:

Elements:

- Class: What type of point is this? 0=Unused or Ignore, 1=Wheel, 2=S
- Longitudinal Position: The longitudinal distance, in feet, of the poi defined datum point. Positive is forward.
- Lateral Position: The lateral distance, in feet, of the point from th point. Positive is to the right.
- Vertical Position: The vertical distance, in feet, of the point from t datum point. Positive is upward.
- Impact Damage Threshold: The speed, in feet per minute, at which the ground can cause damage. This value is scaled with the realism less tolerance on the higher realism settings.
- Brake Map: For wheels only, defines which brake input drives the b 1=Left Brake, 2=Right.
- Wheel Radius: The radius of the wheel, in feet. This is used to corr wheel rotation.
- Steering Angle. The maximum angle each way that a wheel can be degrees.
- Static Compression: The amount the wheel's strut is compressed wl feet. This term defines the strength of the strut. A smaller number "stiffness" of the strut.
- Ratio of Maximum Compression to Static Compression: Used primar gear strut animation to determine the relative amount that the str
- Damping Ratio: Used to determine how strut forces are damped. A be critically damped, while a value of 0 would be completely unda
- Extension Time: The amount of time it takes the landing gear to fu normal conditions. Use 0 (zero) for non-retractable gear.
- Retraction Time: The amount of time it takes the landing gear to f normal conditions. Use 0 (zero) for non-retractable gear.
- Sound Type: This maps the point to the correct sound type. 0=Cent 1=Auxiliary Gear, 2=Left Gear, 3=Right Gear, 4=Fuselage Scrape, 5

6=Right Wing, 7=Aux1 Scrape, 8=Aux2 Scrape, 9=Tail Scrape

- Airspeed Limit: The speed at which extension becomes inhibited, i (zero) to ignore this functionality. This is a function of the Realism this number for non-retractable gear.
- Damage from airspeed: The speed above which gear accrues dama effect is scaled by the Realism settings. Omit it for non-retractable

Other contact reaction parameters:

- max_number_of_points: The maximum number of points that the p for in the [contact_reaction] section. The default is 25 if you do nc
- static_cg_height , static_pitch: The height and pitch of the aircraf the surface. The program uses these values when placing the aircr at startup, when slewing, and any other time the simulation is not aircraft position.

Flap Articulation

You can configure wing flap articulation in the `[Flaps.0]` section of t

You can specify the normal flap extension/retraction time in seconds witl parameter:

```
Extending-time=time
```

Position 0 (zero) should always refer to the fully retracted position, and t positions should be in the corresponding order from fully retracted to full following list of parameters defines the characteristics of each flap positi

```
Flaps-position.0=0, 0
Flaps-position.1=45, 200
Flaps-position.2=90, 100
```

The .*n* (.0, .1, and .2 above) indexes the discrete position available in the The first parameter is the extension in degrees. The second parameter is airspeed, in knots, above which flap movement may be inhibited. A value this parameter specifies no limit.

Flaps can be damaged (scaled by Realism) if flown above the indicated ai by using:

```
Damaging-speed = speed
```

Slow or inhibited movement may evidence this damage. Flaps may be sev even departing the aircraft, if the speed exceeds that specified in:

```
Blowout-speed = speed
```

Aircraft Exits

You can specify the characteristics of the aircraft's main door as follows:

```
[exits]
number_of_exits = 1
exit_rate.0 = 0.4
```

where `exit_rate` is the percent per second, or simply 1/time to open

Folding Wings

You can specify the folding wing characteristics of carrier-based aircraft a

```
[folding_wings]
wing_fold_system_type = 1
fold_rates = 0.12,0.11
```

You can set `wing_fold_system_type` to 1 or 0. "1" specifies that wings are foldable; "0" means the wings can't fold. The first `fold_rate` specifies the left wing rate, and the second specifies the right wing rate. indicates *percent per second.*

Arresting Gear

You can configure arresting gear on carrier-based aircraft as follows:

```
[TailHook]
tailhook_length=4
tailhook_position = -15.0, 0.0, -1.(
cable_force_adjust = 1.0
```

where the `tailhook_length` is in feet from the `tailhook_pos` the position, in feet, from the datum point of the aircraft. You can use th to increase or decrease the tension to which the cables are adjusted for t cable tension is automatically configured for this aircraft's mass and norm speeds, so this term is usually correct at the default value of 1.0.

Views

You can specify the pilot's normal eyepoint (the position of his eyes relati and therefore his view) as follows:

```
[Views]
eyepoint= -6.2, 0.00, 3.55
```

These values represent the longitudinal, lateral, and vertical positions, in normal eye position.

Landing Signal Officer

In CFS2 the speed at which the LSO brings an aircraft in to land on the ca based on characteristics specific to that aircraft. Specifically, to determi CFS2 uses the following formula:

```
"LSO speed"*stall speed*1.45 = descent velocit
```

You can scale landing speed using the following parameter:

```
[LSO]
LSOAdjustSpeed = 1.0
```

To increase the aircraft landing speed, increase the value for "LSOAdjustS increments of 0.1 (1, 1.1, 1.2, etc.).

Propeller Rotation

New to CFS version 2 is the ability to adjust the rotation of each player-fl propeller. You can adjust this function by manipulating the "rotation" valu `[propeller]` section of the *aircraft.cfg*

(see the "Aircraft Container" section of the FS2000 SDK for details).

Below is an example of the new rotation functionality from the P-38 *aircr*

```
[propeller]
thrust_scalar=1.0
rotation= -1,1
```

The thrust generated by a given propeller is a function of the power deliv propeller shaft, RPM, blade angle, airplane speed, and ambient density. T `thrust_scalar` parameter scales the calculated thrust for propeller engines.

Note that the rotation values are comma separated, and are in engine nu "-1" describes the rotation as counter-clockwise (as viewed by the pilot) o (left) engine.